Tributary junctions as hotspots for biological productivity and diversity

Correigh Greene, Peter Kiffney, Jason Hall, NOAA Fisheries*

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Emerging ecological research suggests that network connections may have nonlinear effects on habitat formation, but thus far little research has been directed toward the effects of tributary junctions on fish communities. We hypothesized that tributary junctions would affect fish by increasing invertebrate prey availability, influencing physical habitat characteristics such as temperature, velocity and presence of pools, and affecting the loading of large woody debris. We tested these hypotheses in the Cedar and Skagit River watersheds of northwest Washington by measuring habitat attributes, nutrient levels, primary productivity, invertebrate abundance and fish densities upstream and downstream of tributary junctions. We found that peaks in these characteristics were associated with tributaries, and that some of these peaks had substantial downstream effects. The size and frequency of these effects were associated with relative tributary area (the percentage of the watershed in a tributary upstream of a tributary junction). These findings suggest that researchers and land managers interested in maintaining biological diversity would benefit from integrating a network approach to watershed conservation